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ABSTRACT

This fourth in a series of eight modules for a course titled Quality Assurance Practices describes the activities of identification, storage, and handling of components, parts, and materials. The module follows a typical format that includes the following sections: (1) introduction, (2) module prerequisites, (3) objectives, (4) notes to instructor/student, (5) subject matter, (6) materials needed, (7) procedures, (8) data table, (9) reference materials, (10) test. (The course is one of fifteen technical courses for the second year of a two-year postsecondary curriculum in Nuclear Quality Assurance/Quality Control Technology.) (LRA)

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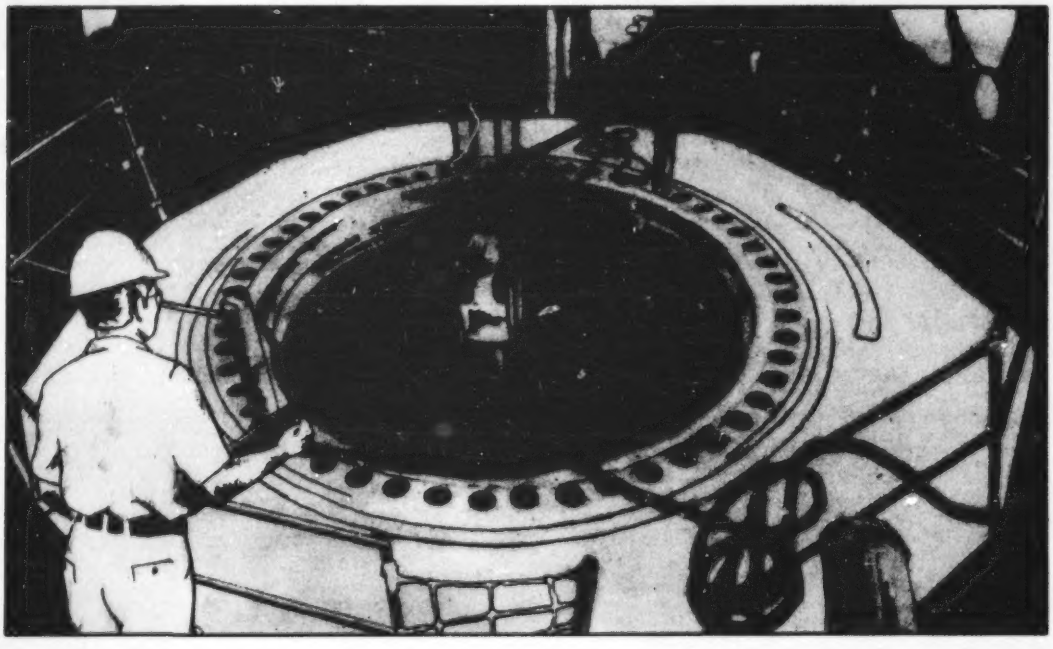
NUCLEAR TECHNOLOGY

COURSE 31 QUALITY ASSURANCE PRACTICES

MODULE 31-4 Identification, Storage and Handling of Components, Parts and Materials



CE 024 288

GENERAL PHYSICS CORPORATION
Columbia , Maryland

COURSE MODULES

COURSE 31 QUALITY ASSURANCE PRACTICES

Module 31-1	Overall Quality Assurance Program
Module 31-2	Vendor Qualification
Module 31-3	Receiving Inspection
Module 31-4	Identification, Storage and Handling of Components, Parts and Materials
Module 31-5	Non-Conforming Materials
Module 31-6	Certification and Qualification of Quality Control Inspectors
Module 31-7	Auditing for Quality Assurance
Module 31-8	Document Handling, Storage and Retrieval for Quality Assurance

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This module was prepared for General Physics Corporation by Ed Wasil and John Espy, General Physics Corporation.

GENERAL PHYSICS CORPORATION

1979

INTRODUCTION

The Nuclear QA/QC Technician may be assigned responsibilities for periodically inspecting the identification, storage, and handling of items at the nuclear power plant site. These inspections are performed in accordance with written procedures which identify the types of observation and the acceptance criteria. Knowledge of identification, storage, and handling practices is necessary to accomplish these inspections.

This module describes the activities of identification, packaging, handling, and storage. The identification methods are described and required types of information are listed. The protective measures associated with packaging, shipping, receiving, handling and storage are described. The rationale for levels of protection is given and key features of each level are described.

This module concludes by describing the inspections associated with handling and storage activities. Inspection attributes and methods are described. Receiving inspection is beyond the scope of this module.

MODULE PREREQUISITES

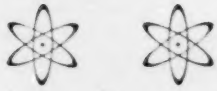
The three previous modules of this course should be completed before proceeding to this module.

OBJECTIVES

Upon completion of this module, the student/trainee can:

1. Describe any of seven identification methods when given the name of the method.
2. State the purpose of protective measures during the activities of shipping, receiving, storage, and handling.
3. Describe the product characteristics considered in categorizing product as requiring levels A, B, C and D protection.
4. Describe the protection afforded by the following packaging features:
   a. barriers
   b. dessicants
   c. caps and plugs
   d. containers
   e. inert gas blanket
   f. contact preservative
   g. blocks, braces, and cushions
5. Describe the identification of containers used for shipping or storage of items including at least five types of information required of such identification.
6. Briefly describe storage conditions for protection levels A, B, C, and D.
7. Briefly describe the inspection of storage conditions with respect to:
   a. identification
   b. covers, plugs and seals
   c. dissicants
   d. inert gas blankets
   e. physical condition
   f. cleanness

8. Briefly describe the inspection of handling equipment with respect to:
   a. visual inspections
   b. nondestructive examination
   c. load tests
9. Perform inspections of storage conditions.



NOTES TO INSTRUCTOR / STUDENT

The Procedures of this module require inspection of packaged items. To perform these procedures, packaged items received by your institution for any purpose may be used. Also, storage rooms may be inspected as described by this module.

SUBJECT MATTER

PRODUCT IDENTIFICATION

Source of Requirements

Equipment, components, parts, and materials used in the construction and maintenance of nuclear power plants are required to meet codes and standards that are made mandatory by federal, state, and local regulations and by specific design of the plant. Identity of these items is required to provide positive evidence of exactly what items are on-hand and used. Such identity is required to be on or attached to the item either permanently or until installation is documented.

The specific identification required is dependent on the technical code, standard, specification, and/or drawing which characterizes the design of the item. Typically, design drawings specify the required identification by either stipulating such identification or by referencing the technical document which contains identification requirements. In either case, the method of identification and the amount of identification is specified

Types of Identification Methods

The exact identification method for a given item is specified by the technical document which characterizes the design of that item. Therefore, only a survey of popular methods is possible within this module. QA/QC technicians on the job would refer to the governing technical document to determine the identification method for a given item.

Identification methods include (1) nameplate, (2) stamping, (3) marking, (4) casting or molding, (5) labeling (6) tagging, and (7) vibra-tool. The method used must be permanent unless otherwise specified and it must not be deleterious to the function of the item. Each method

typically requires the amount of identification to include (1) manufacturer, (2) item nomenclature, (3) model, heat, or lot number, (4) serial number, if serialization is required, and (5) ratings such as pressure, electrical ratings, speed, etc. The governing technical document specifies the minimum required identification.

Nameplates are commonly used for identification of equipment and components. For example, nameplates are used for pressure vessels, pumps, valves, generators, motors, turbines, switchgear, control panels, pressure transmitters, etc. Entries on nameplates are typically made by chemical etching or die stamping. In either case, entries are typically made prior to attaching the nameplate to the item for reasons of practicality and avoidance of damage to the item. Nameplates are attached by tack welding or threaded fastener or both.

Stamping is often used for applying identification to metallic alloys in the melt, semi-finished, and finished stages. Examples include ingots and billets supplied by a material melter, wrought product, forgings, and rolled product. However, another method is used if stamping interferes with the junction of these items and, therefore, is not always used, especially for rolled products. Stamping is used for some parts and components although restrictions typically apply. Welders of ASME pressure retaining items are required to use identification stamps for weld traceability.

Stamping is accomplished by die-stamps which are struck against the item. Low stress die stamps which have a liberal radius on the characters are typically required in order to avoid creation of sharp notches which localize stresses in service. Stamping is applied to non-working surfaces to avoid interference with function. Where subsequent processing removes the stamped identification, the item must be reidentified by some method at the operation

which removed the original identification, if traceability is a requirement.

Marking generally refers to some method of printing identification on the item using ink, crayon, or other marking material. The marking must be legible and it must withstand subsequent processing unless provisions are otherwise made. Where marking is known to be removed by subsequent processing, reidentification must occur at the operation which removed the marking.

Marking is used for a variety of product. Examples include pipe, tubing, forged bars, mechanical parts, electrical components and parts, and welding rod and electrode. Marking by ink or crayon is frequently used for identification of items in process at fabrication stops. It provides a quick method of re-identification at operations where original marking is removed. Marking is also used for placing item identification on the item's shipping container.

Casting and molding identification refers to identification made by the mold for cast or molded products. The identification characters are typically indented in the mold which results in raised characters on the product. The inverse may also be used. The manufacturer's inspection of cast or molded products includes visual examination of identification for completeness, accuracy, and legibility.

Labeling refers to metallic or paper labels which have adhesive backing or which are attached by some adhesive material such as a glue. Because nameplates are less likely to separate from the item, nameplates are more likely to be used than labels if space is available. Labels tend to be used where nameplates cannot be used, due to space restrictions and marking or tagging is not practical. An example is small diameter wire and straight length welding rod. Labels are also widely used for placing item identification on the item's shipping container.

Tagging refers to the attachment of metallic or paper tags by wire or other fastening method. Tags are easily attached but also easily removed. Tags are frequently used for parts where other identification methods would interfere with functionability.

Vibra-tools are electrical vibrators with a carbide tip which marks items by indentation. Skillful use is necessary to provide legible characters. Vibra-tool marking is typically used for in-process or temporary marking.

With any of the identification methods, identification is applied directly to the item unless otherwise allowed by governing technical documents. Where identification is impracticable on the item, identification on the item's container is typically allowed. Examples include spooled wire, spooled welding electrode, and boxes of small parts such as threaded fasteners and pins.

PROTECTIVE MEASURES

Purpose

During the construction phase of nuclear power plants, items are received in advance of need dates insofar as possible. Advance receipt of items avoids loss of labor hours due to unavailability of materials, components, and equipment. From the time of receipt of items until the time of use of the items, protective measures are necessary to maintain quality of the items. Similar protective measures are necessary in the operations phase for repair parts. In order to quickly support maintenance operations, an inventory of repair parts is kept on-hand. Protective measures are necessary to maintain quality of such parts. Protective measures commence with the packaging and shipment

of items by the supplier and end with the installation of items into plant systems. Thus, protective measures serve to prevent damage, deterioration, and contamination of items during the activities of packaging, shipping, receiving, handling, storage, and issue.

Classification of Protection

Specific protective measures which are necessary are dependent on the nature of the specific item to be protected. Nonetheless, it is possible and practical to group items by general levels of protection. Items within a given group are given a corresponding general level of protection with any additional specific protection dependent on the specific nature of each item. An analogy is found in the supermarket. One can categorize items in the supermarket by levels of temperature protection. The categories are frozen, chilled, and ambient. Within these categories, further protection is dependent on the item. For example, most canned goods and bread products are both at ambient temperature but are physically segregated to avoid damage to the more vulnerable bread products.

Four levels of protection are provided for nuclear power plant items. Items are categorized as requiring Levels A, B, C, or D protection. Within each level, there can be a range of controls such that the detailed protective measures applicable to a given item are dependent on the nature and importance of the item.

The purchaser of items is responsible for categorizing items by level of protection. The purchaser may directly categorize items or may identify the levels of protection to the supplier and require the supplier to categorize the item. In the event the supplier packages items of different levels in the same package, the highest designated level of protection must be provided.

Level A Classification

Items are categorized as level A if they are exceptionally sensitive to environmental conditions and require special protective measures for one or more of (1) narrow temperature limits, (2) sudden temperature changes, (3) humidity and vapors, (4) gravitional forces due to acceleration or deceleration, and (5) airborne contamination such as rain, snow, dust, dirt, salt spray, and fumes. An example of a level A item is electronic equipment whose components are highly sensitive to temperature, humidity, and chemical attack. Another example is chemicals whose exposure to either atmospheric conditions or temperatures outside defined limits cause undesirable chemical reactions. Another example is special nuclear material in gaseous, powder, or pellet form. Special nuclear material is either enriched uranium or plutonium.

Level B Classification

Items are categorized as level B if they are sensitive to the conditions described for level A but do not require the special protection required by Level A. For example, level B items would not require as narrow temperature or humidity controls as level A items. Examples of level B items include electronic instrumentation, motors, generators, gaskets, seals, welding electrode, batteries, computers, air filters, control panels, and electrical switchgear.

Level C Classification

Items are categorized as level C if they require protection from the environment, airborne contaminants, acceleration/deceleration forces, and physical damage but are not particularly susceptible to deterioration from water vapor, condensation, and large temperature variations. Examples of level C items include pumps, valves

fluid filters, compressors, auxiliary turbines, fans, blowers, and thermal insulation.

Level D Classification

Items are categorized as level D if they are less susceptible to the environment than level C. Such items require protection from airborne contamination and physical damage. Examples of level D items include heat exchangers, reactor vessels, steam generators, pressurizers, structural steel, electrical cable, and piping.

PACKAGING

General

Packaging of items is required to prevent deterioration, contamination, and damage during the evolutions of shipping, handling, and storage. The degree of protection varies according to the nature of the item and conditions it is subjected to in shipment, handling and storage. Items are categorized as levels A, B, C, or D and packaged within the guidelines of the protection level and the specific protection measures required for the specific item.

Level A Packaging

The key materials for level A packaging are (1) barriers, (2) dessicants, (3) caps and plugs, and (4) containers or crates. These packaging materials are used to enclose the level A item in a vapor proof, dry atmosphere and to anchor and brace the item.

Barriers used for level A packaging are generally flexible material designed to withstand the penetration of water, water vapor, grease, and harmful gases. Thickness of the barrier material is selected such that the barrier

is not easily damaged by puncture, abrasion, weathering, cracking, wind conditions, and the like. Barriers used with stainless steel products must be non-halogenated. All barriers must be noncorrosive and fire retardant. Level A items which are not damaged by condensation are dried and placed in barrier material without desiccants The barrier need not be vapor-proof and it may be taped or sealed. Level A items which are susceptible to damage from condensation are dried and placed in vaporproof barrier materials with dessicant. In this case, the barrier is sealed. Also, the end which may be opened at receiving has sufficient extra barrier material to permit two openings and resealings.

Dessicants are dehydrating agents which absorb moisture from the air. Dessicants may be contained by bags or canisters. When used, dessicants are secured within the vapor-proof barrier in order to prevent damage to the item or barrier by movement of the dessicant. The use of dessicant and the number of bags or canisters must be included in the identification on the container or crate.

In lieu of dessicants, contact preservatives or inert gas blankets can be used. Contact preservatives must not be harmful to the item and must be removable by a cleaning agent which is not harmful to the item. The need for periodic reapplication of contact preservatives must be identified. Inert gas blankets may use nitrogen, helium, or argon, unless specified otherwise. A means of pressure measurements must be provided. The container must be marked to clearly show the use of an inert gas blanket for protection of the item.

Caps and plugs are used to seal all openings in level A items. They are also used to cover and protect from physical damage and features as threads, weld end preparation, and protuberances. In lieu of caps or plugs, pressure sensitive tape may be used to seal openings.

Containers or crates are required for level A items. Containers may be nailed wood boxes, fiberboard boxes with or without wood cleats, metal or fiber drums, or other specially designed container. Crates are a type of container which uses wood products or metal alloys in their construction. Crates are required for items in excess of 500 pounds. Skids are always used with crates to permit entry of lifting devices under the crate. Skids are also required on boxes having a gross weight of 100 pounds or more. Such skids must provide a minimum floor clearance as provided by four inch lumber.

The level A item within its barrier must be anchored, blocked, braced, and/or cushioned as necessary to prevent physical damage to the item or its barrier. Motion in six directions at right angles to one another must be prevented by blocking and bracing. Cushioning is used where protection from shock and vibration is required. Anchoring refers to fastening the item in a crate or on a skid. Bolting is the preferred anchoring method to facilitate removal of the item.

Containers for level A items are marked on at least two sides using waterproof ink or paint or tags or labels. As a minimum, identification marking must include (1) destination, (2) supplier's return address, (3) purchase order number, package number, and total number of packages, (4) material identification number, (5) handling instructions, (6) weight when in excess of 100 pounds, and (7) special instructions. Handling instructions include as appropriate: fragile, center of gravity, keep dry, this side up, sling here, do not freeze, and stacking limitaions. Special instructions include notice of dessicants, inert gas blanket, special unpacking instructions or restrictions, and storage requirements.

Level B Packaging

Level B packaging is the same as for Level A except that humidity control and special provisions for shock and vibration are not required. This means that barriers need not be sealed and dessicants are unnecessary. Also, the extent of cushioning necessary is typically less than for level A.

Level C Packaging

Level C packaging includes the use of (1) containers or crates, (2) caps and plugs, (3) blocks, anchoring, and braces, and (4) identification marking on containers. Criteria for these items if similar to that described previously for level A packaging. Level C packaging provides protection from exposure to salt spray, rain, dust, dirt, and other airborne contaminants.

Level D Packaging

Level D packaging includes the use of (1) caps and plugs, (2) blocks and braces if packed in containers, (3) suitable atmospheric protection as necessary, and (4) identification marking on containers or the item. All openings are capped or plugged. Where containers are used, adequate blocking, bracing, and possibly cushioning is used to prevent physical damage. If the item is susceptible to atmospheric damage, the item is suitably protected by either container or barrier materials. Identification to similar to that described for level A packaging.

HANDLING

General

Handling of received items employs equipment and techniques which minimize the possibility of damaging the items. Handling equipment is selected to be compatible with the item shape, weight, and lifting points. Where necessary, written procedures are developed which specify specific handling techniques.

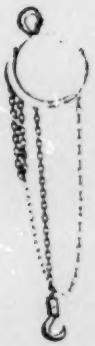
Lifting and Hoisting Equipment

Lifting and hoisting equipment is certified by the supplier as to its capacity. The certification identifies rated load, any special instructions pertaining to use of the equipment, and operating parameters for powered equipment. While there is a wide variety of such equipment, a few of the common hoists, lifts, and cranes are illustrated in Figure 31-4-1.

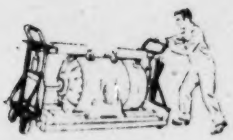
Procedures and Techniques

Written handling procedures are prepared for the handling of items where planned detailed techniques are necessary to prevent damage. Such procedures are made necessary by (1) weight or size of the item, (2) susceptibility of the item to shock, (3) high nil ductility transition temperatures, or (4) other special conditions. Examples include reactor vessels, steam generators, turbines and switch gear. Such written procedures detail (1) weights, (2) sling locations, (3) balance points, (4) maximum hoist line speeds, and (5) other pertinent instructions such as use of spreader bars.

(a) Ratchet Chain Hoist

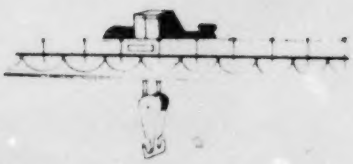


(b) Hand Chain Hoist



(c) Hydraulic Hand Truck

(d) Fork Lift



(e) Overhead Traveling Crane

(f) Truck Crane

Figure 31-4-1. Examples of Handling Equipment

Whether a written procedure applies, persons who handle items follow a cardinal rule. That is, handling equipment is never used for items whose weight exceeds the rated capacity of the handling equipment. The "weakest link in the chain" concept applies. Each load bearing member of the handling rig must have a rating equal to or greater than the weight of the item to be lifted. This includes hooks, slings, rings, and chains as well as the primary handling equipment. Safety rules and regulations may require that personnel performing material handling or hoisting operations be suitably trained in the use and maintenance of equipment

STORAGE

General

Storage of items must be such that the possibility of damage, deterioration, or contamination of items is minimized. The level of protection necessary is dependent on the nature of the specific items but within one of the defined four levels of storage. These levels are comparable to the packaging levels and the packaging provides much of the protection necessary during storage. Additional protection is provided as necessary by the use of buildings, heating and air conditioning systems, coverings, and administrative controls.

All storage areas are arranged and controlled in such a manner as to minimize handling of items and risk of accidental damage from vehicular traffic, cranes and hoists. Hazardous materials such as chemicals, paints, and solvents are stored in well ventilated areas not in close proximity to important nuclear plant items. All items in storage are arranged such that racks, cribbing, or crates support the weight of the item without distortion of the item. Also, identification is maintained on all items in storage. Items

are positioned in storage and that identification can be verified with minimal handling.

Large items are typically stored in their shipping crates on floor skids. Uncrated large items are typically stored on floor skids whether inside or outside storage applies. Smaller items are typically stored on shelfs or racks such as that illustrated in Figure 31-4-2.

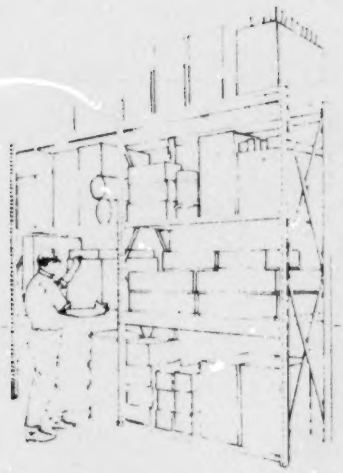
Cleanliness and housekeeping measures are used to minimize possibility of damaging or contaminating items in storage. Periodic cleaning of storage areas is accomplished to avoid the accumulation of trash, discarded packaging materials, and other soild. Foods and drinks are prohibited in storage areas. Salt tablet dispensers are prohibited. Rodent control should be provided as necessary.

Level A Storage

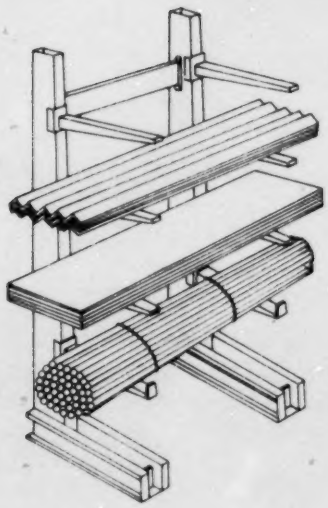
Buildings or equivalent enclosures are provided for level A storage which are constructed to be fire resistant, tear resistant, weathertight, and well ventilated. The structure is located so as not to be subjected to flooding. It has paved floors or equal which are well drained. Temperature and humidity is controlled within the limits specified for the level A items. Such control is typically localized in the area of level A storage although it could be applied throughout the building. The building's ventilation system is equipped with filters to remove dust and harmful vapors. Items are stored on pallets or shoring to provide for suitable ventilation.

Level B Storage

Level B storage is similar to level A except that humidity control is not required and temperature is controlled only between 40°F and 140°F unless a level B item requires narrower temperature limits. All other provisions of level A storage apply for level B.



(a) Multi-Tier Shelving



(b) Cantilever Racks

Figure 31-4-2. Examples of Storage Equipment

Level C Storage

Level C storage is indoor storage which does not require temperature control. The building is fire resistant and weathertight, has paved floors or equal, and is well drained. It should not be susceptable to flooding and rodent control should be provided. It does not require a heating system. Items are placed on pallets or shoring to provide air circulation.

Level D Storage

Level D storage is outside storage. The storage area is marked, well drained, and reasonably removed from traffic areas. Gravel covered or paved areas are preferred. Items are stored on cribbing or equivalent to allow for air circulation and to avoid entrapment of water.

When protection from weather conditions is necessary, level D items are covered with flame-resistant sheeting or tarpaulins. Such coverings are placed to provide drainage and to insure air circulation to minimize condensation. The coverings are tied down to prevent moisture from entering laps and to protect the coverings from wind damage.

INSPECTION

Scope and Purpose

Inspections associated with identification, handling, and storage include (1) receiving inspection, (2) inspection of storage conditions, and (3) inspections of handling equipment. Receiving inspection determines acceptability of items upon receipt and involves techniques which are beyond the scope of this module. It is sufficient to recognize that receiving inspection is accomplished prior to storage

and that the handling techniques described by this module are utilized. Inspection of storage conditions and handling equipment is performed on a periodic basis as described

The purpose of inspections of storage conditions and handling equipment is to verify periodically that the integrity of items and their protection is maintained. Deficiencies found are documented and reported to the organization responsible for storage or handling for corrective action.

Inspection of Storage Conditions

The owner or an authorized contractor thereof is responsible for establishing an inspection program for storage. The inspection program is documented in the form of written inspection procedures which include frequency and type of inspections. The inspection program typically addresses (1) identification, (2) covers, plugs, and seals, (3) contact preservatives, (4) desiccants and inert gas blankets, (5) physical damage, and (6) cleanness.

Inspection for identification verifies that items and their containers remain identified as described previously in this module. As items are issued from stores in partial quantities, Material Services Technicians must ensure remaining quantities have proper identification. This may require technicians to complete additional identification tags in cases where one tag identifies a quantity of a given item. Also, improper storage and handling practices can result in loss or obliteration of identification. If inspection finds unidentified items, the items are treated as nonconforming until their identity has been positively determined.

Inspections of covers, plugs, and seals verifies that openings in items are plugged or sealed and that outside

storage items are covered as required. These devices prevent internal contamination and/or weathering of items and should remain in place throughout the storage period. Temporary removal of these devices should be followed by restoring the devices.

Inspections of contact preservatives verifies that the preservative is in good condition. The inspection determines that the preservative has neither deteriorated nor dislodged due to contact with other items or weather conditions. Reapplication of preservative is required as necessary to maintain a uniform coating.

Inspections of dessicants and inert gas blankets verifies that humidity control remains intact. Items with desiccants have a humidity indicator inside the barrier which is visible through the barrier. Inert gas blanket inspection is performed by measuring gas pressure. Typically, pressure must be at least 5 psig.

Inspection for physical damage is a visual inspection of randomly selected items. Items in each level of storage are typically inspected. If damage is observed, the item is considered as nonconforming pending disposition of the specific damage.

Inspection for cleanness is a visual inspection of items and storage spaces. This inspection also typically checks required temperature controls for level B storage. The inspection verifies compliance with housekeeping policies and maintenance of cleanness of items.

Care of Items in Storage

Certain items require maintenance during their storage period. Such maintenance is planned and documented by written procedures. Regardless of which department performs the maintenance, quality control inspectors typically verify

completion of maintenance on schedule as part of the storage inspection program. Typical maintenance items are as follows:

- periodic energizing of instrumentation
- continual energizing of space heaters within motors, generators, and other electrical equipment
- periodic insulation tests on motors and generators
- periodic rotation of shafts of rotating equipment to new positions.

Inspections of Handling Equipment

The utility or its authorized contractor is responsible for developing and implementing a program of inspections of handling equipment. The program is documented in the form of written inspection procedures and administrative controls for scheduling the inspections. The inspection methods are (1) visual inspections, (2) nondestructive examinations, and (3) load tests.

Visual inspections are performed to detect evidence of deterioration of handling equipment. Items made subject to visual inspection include slings, cables, chains, hooks, turnbuckles, eyes, shackles, and powered hoisting equipment. Typical attributes covered by visual inspection are:

- fraying and wear of slings and cables
- cleanness of all items which possibly contact product
- deformation or yielding of hooks, turnbuckles, eyes, shackles, rails, beams
- lubrication of powered hoisting equipment

Nondestructive examination are performed to detect cracks in hooks, turnbuckles, eyes, and shackles. Magnetic particle examination is typically employed. The inspection program may submit all rigging items to this examination or it may identify only certain items of high rating or usage factor for this examination.

Load tests are typically performed on cranes and hoists which are used in handling operations which are so important as to require written handling procedures. The load test is typically a dynamic test when the test load is lifted, transversed, and lowered. Such dynamic load tests are typically required prior to use of the handling equipment for lifting of components which require handling procedures.

EXERCISES

1. Identify criteria by which product is categorized into protection levels by completing the right hand column:

Protection Level	Product Criteria
A	
B	
C	
D	

2. Describe identification methods by completing the right hand column:

Method	Description
nameplate	
stamping	
marking	
casting or molding	
labeling	
tagging	
vibra-tool	

3. Describe the protection afforded by packaging features by completing the right hand column:

Feature	Protection
barriers	

desiccants

caps and plugs

containers

inert gas blanket

contact preservative

blocks, braces, and
cushions

4. Describe storage conditions for each level of protection by completing the right hand column:

Storage Level	Storage Conditions
A	
B	
C	
D	

MATERIALS

The following materials are required to support this module:

sample of items packaged in containers or crates

sample rigging consisting of wire slings, devices, eyes, shackles, hooks etc.

sample of rigging consisting of defective wire slings, hooks, shackles, etc., if possible

PROCEDURES

1. Inspect received items assigned by the instructor. Complete data table 31-4-1 and discuss entries in class.
2. Inspect rigging and complete data table 31-4-1 and discuss entries in class.
3. Tour a construction site storage facility. Take notes on (a) type of structure, (b) atmospheric controls, (c) methods of storage, (d) housekeeping, (3) identification of items. Discuss notes in class.

DATA TABLE

TABLE 31-4-1
Inspection of Packaging

Item Name:_____Number:_____
Description of container:

_____

_____

_____

Identification on container:

Type:_____Location:_____
Entries:_____

_____

_____

_____

Identification on Item:

Type:_____Location:_____
Entries:_____

_____

_____

_____

Record results of inspection for cleanness and evidence of damage:_____

_____

_____

_____

TABLE 31-4-2
Inspection of Rigging

Item	Results of Visual Inspection

REFERENCE MATERIALS

Juran, J.M., Quality Control Handbook, 1974, McGraw Hill, Inc.

ASME, Quality Assurance Program Requirements for Nuclear Power Plants, ANSI N45.2, The American Society of Mechanical Engineers

ASME, Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants, ANSI N45.2.13, The American Society of Mechanical Engineers

ASME, Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants, ANSI N45.2.2, The American Society of Mechanical Engineers

ANS, Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants, ANS 3.2/ANSI N18.7, American Nuclear Society

TEST

1. Describe these identification methods:
   a. nameplate

   b. marking

   c. tagging

2. Protective measures are applied to products throughout the activities of shipping, receiving, handling, and storage; what is the purpose of such protective measures?

3. Items are categorized as requiring protection level A, B, C, or D; describe the product characteristics used to categorize product for each level.
   a. Level A -

   b. Level B -

   c. Level C -

   d. Level D -

4. Describe the protection afforded by the following packaging features:
   a. barriers

   b. caps and plugs

   c. blocks, braces, and cushions

5. Describe the identification of containers including five types of information required to be identified.

6. Differentiate between level A and level B storage.

7. Describe level D storage.

8. Briefly describe inspections of storage conditions with respect to:
   a. covers, plugs and seals

   b. physical condition

   c. cleanness

9. Briefly describe inspections of handling equipment with respect to:
   a. visual inspections

b. nondestructive examinations

c. load tests